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तंरगपथकों के लिए फ्लैंज — विशिष्टि

भाग 2 साधारण आयताकार तरंगपथकों के लिए फ्लैंज

अनुभाग 1 सामान्य

Indian Standard

FLANGES FOR WAVEGUIDES — SPECIFICATION

PART 2 FLANGES FOR ORDINARY RECTANGULAR WAVEGUIDES

Section 1 General

UDC 621·372·831

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

January 1991 **Price Group 3**

Microwave Components and Accessories Sectional Committee, LTD 19

FOREWORD

This Indian Standard (Part 2/Sec 1) was adopted by the Bureau of Indian Standards on 22 December 1989, after the draft finalized by the Microwave Components and Accessories Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

This standard shall be read in conjunction with IS 10738 (Part 1) : 1983 'Flanges for waveguides: Part 1 General requirements and tests'.

While preparing this standard assistance has been derived from IEC Pub 154-2 (1980) 'Flanges for waveguides: Part 2 Relevant, specification for flanges for ordinary rectangular waveguides' issued by the International Electrotechnical Commission.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FLANGES FOR WAVEGUIDES — SPECIFICATION

PART 2 FLANGES FOR ORDINARY RECTANGULAR WAVEGUIDES

Section 1 General

1 SCOPE

1.1 This Indian Standard (Part 2/Sec 1) specifies general requirements and tests for the flanges for ordinary rectangular waveguides.

2 REFERENCES

2.1 The following Indian Standards are necessary adjunct to this standard:

IS No.	*Title*
919 : 1963	Recommendations for limits and fits for engineering
4493 (Part 2) : 1981	Hollow metallic waveguides: Part 2 Ordinary rectangular waveguides
10738 (Part 1) : 1983	Flanges for waveguides: Part 1 General requirements and tests

3 CLIMATIC CATEGORY

See **3** of IS 10738 (Part 1) : 1983.

4 MATERIALS, CONSTRUCTION AND WORKMANSHIP

See **4** of IS 10738 (Part 1) : 1983.

5 DISIGNATION OF FLANGES FOR WAVEGUIDES

See **6** of IS 10738 (Part 1) : 1983.

6 MARKING

See **6** of IS 10738 (Part 1) : 1983.

7 PACKAGING

See **7** of IS 10738 (Part 1) : 1983.

8 TYPES OF FLANGES

8.1 The survey of types of flanges for ordinary rectangular waveguides is given in Annex A.

9 INFORMATION ON REFLECTIONS

9.1 The information on reflection at the flange joints are given in Annex B.

10 TESTS

Provisions of clause **8** of IS 10738 (Part 1)-1983 shall apply *except for/in addition* to the following.

10.1 Relation Between Shank and Alignment Hole Diameter

For each individual flanges, the proper mating of two flanges is ensured by specifying:

a) The location and basic diameter of the holes and the deviations thereon, and

b) The basic diameter of the shanks or coupling bolts with the appropriate fit.

For practical reasons, the following fits are recommended (*see* IS 919 : 1963)

Types of Flanges	*Ranges of Sizes*	*Fit*
Rectangular flanges for Type R waveguide	R 12 and larger	All
	R 14 R 32	A 9
	R 40 R 70	B 9
	R 84 and smaller	C 9
Circular flanges for Type R waveguide	All	B 9

10.2 Flatness of Contact Area

The flatness of contact area shall be better than the values given in the following table:

Range of Sizes	*Requirement*, mm
R 12 and larger dimensions	Under consideration
R 14 to R 26	0·05
R 32 to R 180	0·02
R 220 and smaller dimensions	Under consideration

10.3 Perpendicularity of the Contact Area

The perpendicularity of the contact area of the flange to the axis of the waveguide shall be 90 ± 0·25 degree.

10.4 Addional Requirements

10.4.1 *General*

The drawings shown are for mounted flanges. In the individual drawings, one or more methods are shown by way of example for the mounting of flanges to the waveguide. This, however, does not exclude socket or through-type methods of mounting if the actual dimensions allow this. For flanges having a choke groove, the socket type method should be used.

In the case of flange sizes PDR 3 to PDR 12 inclusive and UDR 3 to 12 inclusive, the particular cross-section of the flanges to be used is left to the discretion of the individual user.

For the grooved flanges, a rectangular gasket is employed An example is shown in Fig. 1B in Section 5. The dimensions of the grooves and gaskets for flange sizes PDR 3 to 12 inclusive have been left for subsequent study.

The flanges are designed for copper alloys, aluminium alloys and magnesium alloys. The particular type of alloy and finish is to be specified by the user. Unless otherwise specified, means shall be provided to reduce to a minimum galvanic or other corrosive action. The particular type of gasket and gasket material is to be specified by the user.

NOTE — For pre-drilled flanges the positioning of the holes should be based on the theoretical symmetry lines of the flanges aperature.

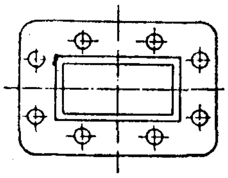
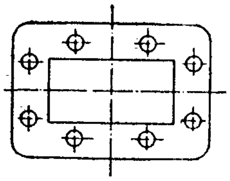
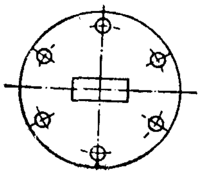
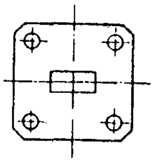
10.4.2 *Ordering Information*

When ordering unmounted flanges an allowance should be made on certain of the specified dimensions to cover the effects of possible machining after mounting.

ANNEX A

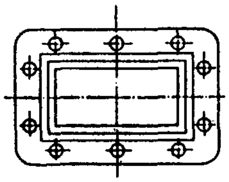
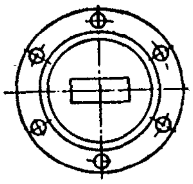
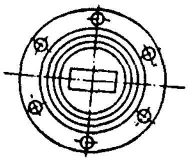
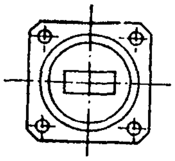
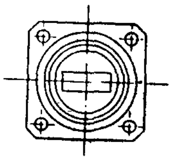
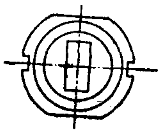
(*Clause* 8)

SURVEY OF TYPES

Gasket Grove: No Choke				**Gasket Grove and Choke**	
Waveguide	**Flange**	**Waveguide**	**Flange**	**Waveguide**	**Flange**
R 3	 Type D	R 3	For subsequent study	R 3	
R 4		R 4		R 4	
R 5		R 5		R 5	
R 6		R 6		R 6	
R 8		R 8		R 8	
R 9		R 9		R 9	
R 12		R 12		R 12	
R 14		R 14		R 14	
R 18		R 18		R 18	
R 22		R 22		R 22	
R 26		R 26		R 26	
R 32		R 32	 Type E	R 32	 Type A
R 40		R 40		R 40	
R 48		R 48		R 48	
R 58		R 58		R 58	
R 70		R 70		R 70	
R 84		R 84		R 84	
R 100		R 100	For subsequent study	R 100	 Type B
R 120		R 120		R 120	
R 140		R 140		R 140	
R 180		R 180		R 180	
R 220		R 220		R 220	
R 260		R 260		R 260	
R 320		R 320		R 320	
R 400		R 400		R 400	
R 500		R 500		R 500	
R 620		R 620		R 620	
R 740		R 740		R 740	
R 900		R 900		R 900	
R 1 200		R 1 200		R 1 200	
R 1 400		R 1 400		R 1 400	
R 1 800		R 1 800		R 1 800	
R 2 200		R 2 200		R 2 200	
R 2 600		R 2 600		R 2 600	

NOTE — The sketches above are only examples: appropriate drawings show the exact number of holes and their position.

SURVEY OF TYPES

Gasket Grove: No Choke				Gasket Grove and Choke	
Waveguide	**Flange**	**Waveguide**	**Flange**	**Waveguide**	**Flange**
R 3	 Type D	R 3		R 3	
R 4		R 4		R 4	
R 5		R 5		R 5	
R 6		R 6		R 6	
R 8		R 8		R 8	
R 9		R 9		R 9	
R 12		R 12		R 12	
R 14		R 14		R 14	
R 18		R 18		R 18	
R 22		R 22		R 22	
R 26		R 26		R 26	
R 32		R 32	 Type B	R 32	 Type A
R 40		R 40		R 40	
R 48		R 48		R 48	
R 58		R 58		R 58	
R 70		R 70		R 70	
R 84		R 84	 Type B	R 84	 Type B
R 100		R 100		R 100	
R 120		R 120		R 120	
R 140		R 140		R 140	
R 180	 Type C	R 180		R 180	
R 220		R 220		R 220	
R 260		R 260		R 260	
R 320		R 320		R 320	
R 400		R 400		R 400	
R 500		R 500		R 500	
R 620		R 620		R 620	
R 740		R 740		R 740	
R 900		R 900		R 900	
R 1 200		R 1 200		R 1 200	
R 1 400		R 1 400		R 1 400	
R 1 800		R 1 800		R 1 800	
R 2 200		R 2 200		R 2 200	
R 2 600		R 2 600		R 2 600	

NOTE — The sketches above are only examples: appropriate drawings show the exact number of holes and their position.

ANNEX B

(*Clause* 9)

INFORMATION ON REFLECTION

Information on Reflection

The reflections at the flange joint are of three kinds:

a) Those caused by the allowed deviations on the internal dimensions of the waveguides;

b) Those caused by lateral displacements of the two flange assemblies; and

c) Those caused by the chokes (in the following, these reflections are not taken into account).

When the deviations on the dimensions of the waveguides [according to IS 4433 (Part 2) : 1981] and of the assemblies (according to this standard) sum up to cause maximum lateral displacement and maximum changes of the waveguide internal dimensions, the theoretical maximum reflection may be calculated from:

$$\text{Reflection loss} = 10 \log_{10} \frac{1}{\left[\frac{\lambda^2 g \triangle a}{4a^3} = \frac{\triangle b}{b} \right]^2 + \left[\frac{4 \cdot 934\,8\, \lambda\, g(\triangle a'^2)}{a^3} = \frac{7 \cdot 895\,7\, (\triangle b'^2)}{\lambda g b} \right]^2}\ dB$$

where

a = basic inside width of the waveguide,

b = basic inside weight of the waveguide,

λg = waveguide wavelength,

$\triangle a$ and $\triangle b$ are waveguide internal deviations, and

$\triangle a'$ and $\triangle b'$ are displacements of the waveguide axes.

NOTES

1 The first term within brackets represents the worst case reflection component at a flange joint caused by changes of the waveguide internal dimensions.

2 The second term within brackets represents the reflection component at a flange joint caused by the displacement of the flange assemblies.

At the high end of the waveguide frequency band, the reflection component is maximum when the displacement exists in the short wall direction only.

At the low end of the waveguide frequency band, the reflection component is maximum when the displacement exists in the long wall direction only.

3 The maximum reflection at the high end of the waveguide frequency band is smaller than the maximum reflection at the low end of the band for the same magnitude of displacement.

4 The 'reflection loss' in decibels is given as a positive quantity.

The Worst 'Reflection Loss' in (Positive) Decibels for Waveguides R 14 to R 500

Frequency	R 14 to R 180	R 220	R 260	R 320	R 400	R 500
f = 1·25 f_c	42·4dB to 41·9dB	41·4dB	41·0dB	39·3dB	37·4dB	35·9dB
f = 1·50 f_c	45·0dB to 44·3dB	43·7dB	43·6dB	41·9dB	40·0dB	38·5dB
f = 1·90 f_c	46·4dB to 45·5dB	44·9dB	45·0dB	43·3dB	41·4dB	39·9dB

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